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BIO-FUELS

BIO-FUELS ANNUAL REPORT

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Report Highlights:
Mexico has just recently started to look at alternative fuels as a way to increase demand for agricultural products, stimulate the rural economy, curb dependence on fossil fuels, and reduce greenhouse gas emissions. Publicly and privately funded research has focused primarily on ethanol and biodiesel derived from agricultural commodities, or “energy crops”. In the opinion of many in the Government of Mexico, bio-fuels may simultaneously stimulate rural economies and relieve political pressure resulting from the NAFTA.

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EXECUTIVE SUMMARY

Mexico has just recently started looking at, and debating the merits of, alternatives to fossil fuels, a trend driven by the rising prices of crude oil and global warming. The two main options being considered are ethanol and biodiesel. Ethanol is often used as a substitute for gasoline additives such as Methyl Tertiary-Butyl Ether (MTBE), which are being phased out because they have been proven to contaminate groundwater and do not reduce greenhouse gas emissions. Additional research has been carried out on fuel derived from biological sources, such as biodiesel, obtained from animal waste and vegetable oils, and used as fuels in some modified diesel vehicles. Due to the fact that bio-fuels are primarily derived from agricultural products, they have become a fashionable topic when addressing rural development and improving living standards in rural areas. The Government of Mexico (GOM) is becoming increasingly interested in developing their bio-fuels capacity because they see it as a way to reduce political pressure related to a number of agricultural commodities, particularly corn and sugar, in light of the upcoming full implementation of NAFTA in 2008.

INTRODUCTION

Information on bio-fuels in Mexico is commonly grouped with more general concepts of "alternative energy sources" or "renewable energy". Mexico's Ministry of Energy (SENER) includes them in the "biomass" category. Thus, because the industry, and the concept, is relatively young, and because bio-fuels are defined and classified differently by government, public, and private sectors, reliable information on bio-fuel usage and production in Mexico is scarce.

Regarding the broader concept of energy generated from bio-mass, according to SENER, this category currently supplies 8% of Mexico's primary energy consumption, none of it related to fuel for transportation. The main sources of bio-energy used in the country are sugar cane bagasse (used for the generation of electricity and heat in the sugar cane industry) and wood (used mainly for heating and cooking). In 2004, 92 Petajoules[*] (PJ) of sugar cane bagasse and 250 PJ of wood were consumed in Mexico. Mexico produces 45 million liters of ethanol annually, which are currently not used as fuel, but rather processed by the chemical and pharmaceutical industry. Currently Mexican consumption of ethanol is 164 million liters, thus, Mexico imports the remaining 119 million liters needed, mainly from the United States, Brazil, and Cuba.

For electricity and heat generation, the bio-energy potential in Mexico is estimated between 2,635 and 3,771 PJ per year. Of the estimated potential, the most significant sources are wood and energy crops (40 and 26 percent respectively). Many private organizations and energy research centers in Mexico believe that the country's agricultural production is particularly appropriate for ethanol and biodiesel production.

With support from the Inter-American Development Bank and GTZ (German Technical Cooperation), SENER is carrying out feasibility studies for ethanol and bio-diesel. These studies are expected to be finished by September 2006 and will serve as a basis for the development of a Mexico specific policy on bio-fuels.

Besides the described governmental source (SENER), additional information was obtained from different private organizations, such as:

[*] 1 Petajoule equals 277.78 million kWh.

- Emision Foundation, non-government organization focused on environmental issues.
- Mexican Bio-energy Network (REMBIO), national association of research institutes.
- Mexican National University's Bio-energy Laboratory (UNAM).
- Monterrey Institute of Technology's Center for Energy Studies (ITESM).
- Veracruz University's Center of Multidisciplinary Investigation (CEVIM).
- Energeticos, wholesaler of diesel and other oil-based fuels.

1. DOMESTIC POLICY ENVIRONMENT

a. Policies supporting production and/or use of bio-fuels

According to SENER, there is currently no specific bio-fuel promotion program in Mexico. The National Energy Plan (NEP) 2001-2006 goes the furthest toward defining a national strategy by mandating that the state-run electricity generation firm (Comision Federal de Electricidad (CFE)) generate at least 1,000 mega-watts of energy from renewable energy sources by the year 2006. In order to achieve this goal, the NEP proposes that both the private and public sectors participate in the development of new renewable energy projects, including: solar, wind, geothermal, small hydropower, biomass, and biogas. The NEP also contains the guiding principles of the Mexican public energy policy: energy sovereignty, assurance of supply, modernization of the energy sector, private sector participation, and commitment to sustainable development.

Due to the recent spike in interest for ethanol, the GOM has decided to analyze for itself the true potential of bio-fuels and other alternative sources of energy. Congress has also gotten involved in this debate. Currently under discussion in Congress, two laws are proposed which will establish the legal framework under which SENER will define its strategy for bio-fuels and other sources of energy.

1. Law for the Use of Renewable Sources of Energy- This law includes the creation of a trust fund that will allow renewable energy sources to reach 8% of national electricity generation by 2012. This proposed law defines bio-fuels as "liquid or gas fuels, such as ethanol, methanol, biodiesel and methane gas, as long as they are produced from bio-mass, or non-toxic and safe organic residues." Within the aforementioned generic trust fund, a specific support would be created to cover any differentials between the cost of production and market prices for bio-fuel.

2. Law for the Development and Promotion of Bio-Fuels- In this proposed law, bio-fuels are defined as "ethanol and biodiesel fuels that are produced from energetic commodities or products originated in agricultural activities." The law originally stated that gasoline in Mexico should include a minimum of 10% ethanol, but that was deemed by the petroleum industry as nearly impossible to comply with in the short term. Thus, in the current version under discussion the percentage requirement has been replaced with a "gradual phase-in" mechanism.

Both of these proposed laws will be brought up for vote in Congress in the fall of 2006.

b. Size of total petroleum based (gasoline and diesel) energy market

Mexico has a long history of producing petroleum-based fuels, starting in 1901, when commercial production of crude oil began. Mexico began to export crude oil in 1911. As oil was viewed very early on as an excellent source of funds for the Government, Article 27 of the Mexican constitution, ratified in 1917, gives the Mexican government a permanent and inalienable right to all subsoil resources. In the late 1930s, the petroleum industry was

nationalized, giving the Mexican government a monopoly in the exploration, production, refining, and distribution of oil and natural gas, and in the manufacture and sale of basic petrochemicals. Between 1938 and 1971 Mexico's oil output expanded at an average annual rate of 6 percent. However, due to population growth and industrialization, by 1957 Mexico was a net importer of petroleum products. Extensive oil discoveries in the 1970s increased Mexico's domestic output and export revenues, and by 1975 Mexico were once again a net exporter of crude oil.

Today, Mexico is still a net energy exporter, though experts believe that the country's oil reserves may be depleting rapidly. Mexico is currently the world's tenth-greatest energy producer, accounting for about 2.4% of the world's total annual energy production. The country is also the 13th largest consumer of energy, accounting for about 1.6% of the world's total annual energy consumption. Mexico's energy needs have gown considerably in the past ten years, as the country now consumes 25% more energy annually than it did a decade ago. An historical summary of Mexico's Total Primary Energy Production (TPEP) and Consumption (TPEC) is shown in Table 1.

Table 1: Mexico's TPEP and TPEC, 1993-2003

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
TPEP	8.11	8.10	8.03	8.74	9.06	9.31	9.06	9.36	9.54	9.60	10.17
TPEC	5.30	5.51	5.43	5.52	5.68	5.96	6.04	6.32	6.23	6.24	6.79

Mexico has petroleum reserves estimated (as of January 2005) at about 15 billion barrels (or about 1.4% of the world total), which ranks it as fourth greatest in the western hemisphere and 15th greatest in the world in that regard. Mexico also currently ranks sixth in the world in crude oil production, accounting for about 4.9% of the world's annual total. Mexico is also the world's eleventh- greatest petroleum consumer (accounting for about 2.5% of the world's annual petroleum consumption), but Mexico's oil production is so much greater than its consumption that Mexico is presently the world's ninth-greatest petroleum exporting nation. An historical summary of petroleum production and consumption in Mexico is shown in Table 2.

Table 2: Petroleum Production and Consumption in Mexico, 1993-2003 (in thousands of barrels per day)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Production (total)*	3,140	3,159	3,075	3,294	3,422	3,501	3,354	3,460	3,570	3,593	3,797
Production (Crude Oil only)	2,673	2,685	2,618	2,855	3,023	3,070	2,906	3,012	3,127	3,177	3,371
Consumption	1,836	1,934	1,819	1,789	1,854	1,949	1,957	2,036	1,990	1,938	2,015

Source: DOE/EIA

*/ Includes crude oil, natural gas plant liquids, other liquids, and refinery processing gain

Because of limited refining capacity, the country typically exports crude and imports refined gasoline and diesel. Table 3 details Mexico's historic, current, and future gasoline and diesel production and consumption.

Table 3: Petroleum-based fuel consumption in Mexico (thousand barrels per day)

	1998	2003	2013 (est.)
Gasoline Production	411.0	449.9	643.2
Gasoline Imports	137.5	141.9	139.7
Gasoline Total	548.8	591.8	782.9
Diesel Production	290.0	307.8	392.9
Diesel Imports	19.4	9.3	15.2
Diesel Total	309.4	317.1	408.1

Source: Ministry of Energy (SENER)

c. Bio-fuels production capacity, current/planned (including local vs. multinational plant ownership)

Although government information regarding potential production of bio-fuels is unavailable, UNAM published a report on biomass' potential as an energy source in Mexico ("Resource Assessment and Technological Outlook of Biomass as a Renewable Energy Source in Mexico.") Using information from the Ministry of Agriculture (SAGARPA) and production coefficients from the Land Institute, a study by Kartha & Larson and Argentinean biodiesel company ABATEC, estimates are calculated for potential ethanol and biodiesel production. It is worth mentioning that this calculation, meant for scientific purposes, would imply that all available resources would be devoted to ethanol production, which in practice is not feasible.

Table 4: Technical resource potential for ethanol and biodiesel production (Mexico, 2000)

Bio-fuel	Commodity (source)	Covered surface (hectares)	Production (MT)	Product yield (lt./hectare or lt./MT)	Fuel production potential (liters)
Ethanol	Corn	---	17,191,073	325	5,587,098,725
	Sugar cane	---	31,592,202	75	2,369,415,184
Total Ethanol					7,956,513,909
Biodiesel	Soy	56,473	---	420	23,718,660
	Sunflower	1,199	---	890	1,067,110
	Avocado	93,984	---	2,460	231,200,640
	Coconut	10,642	---	2,510	26,711,420
Total Biodiesel					282,697,830

According to Fundacion Emision, if the Law for the Development and Promotion of Bio-Fuels is approved and comes into effect, Mexico will require 640 million liters of ethanol annually. This ethanol will be used as fuel additives in Mexico's three largest cities; Mexico City, Guadalajara, and Monterrey. With feasibility studies carried out by Bryan & Bryan Inc. (BBI International), Fundacion Emision believes four ethanol producing units could be built within the next two years, each with a producing capacity of 150 million liters.

Specifically for biodiesel, Monterrey-based ITESM University and Energeticos, a private fuel company, signed an agreement to produce biodiesel from animal fats/oils and use the resulting fuel in busses used by ITESM's student transport system. In July 2005, a small plant with a potential output of 1 million liters per month was inaugurated. With an

investment of U.S. $1.5 million, this is the only registered bio-fuel production project currently operating in Mexico. Since production is self-consumed, neither SENER nor any other government agency keeps track of the plant operation.

2. IMPORT REGIMES FOR BIO-FUELS (I.E. TARIFFS, QUOTAS, OTHER ARRANGEMENTS)

According to Mexico's Customs Administration (Aduana Mexico), ethanol is traded as "ethyl alcohol". There is no equivalent to the U.S. Harmonized Tariff Code (HTC) 9901.00.50, which defines ethyl alcohol or mixtures with ethyl alcohol to be used as fuel or in producing fuel. Instead, Aduana Mexico only uses the following HTC's:

2207.10.01 – Undenatured ethyl alcohol of 80% vol. alcohol or higher.
2207.20.01 – Ethyl alcohol and other spirits, denatured, of any strength.

The requirements for both HTC's are:

- Mixed Tariff: 10% *ad valorem* + US $0.36 per kilogram
- Must comply with labeling requirements detailed in NOM-050-SCFI-2004
- Importer must be registered in General Importer and Specific Alcohol Importer Database.
- Product can only cross through specific border crossing points (defined in Annex 21 of the General Rules for International Trade as Aguascalientes (airport only), San Luis Potosi, Altamira, Cd. Hidalgo, Cd. Juarez, Colombia, Coatzacoalcos, Matamoros, Nuevo Laredo (rail only), Piedras Negras, Tijuana, Tuxpan, and Veracruz)
- Requires additional identification markings (defined in Annex 18 of the General Rules for International Trade to include: 1) Production code; 2) Expiration date; 3) Complete name of product; 4) Brand, names and/or type, if applicable; 5) Number of bottles or cases and their capacity; 6) Lot number, if applicable; 7) Guy-Lussac degrees, if applicable; 8) Volumetric grade of alcohol; 9) If product is not destined as an input for alcoholic beverages, a letter from the producer stating such condition.)

3. ETHANOL TRADE, BIODIESEL TRADE, CORN SWEETENER TRADE

Ethanol Trade

Available information on trade of the aforementioned HTC's of ethylic alcohol is as follows:

Table 5: Exports, HTC 2207.10.01 (in thousands of U.S. dollars)

Country	1995	1996	1997	1998	1999	2000	2001	Jan-Mar 2002
United States	1,916	9,066	13,871	22,937	7,988	9,865	4,181	9
Switzerland	1,606	1,768	1,533	0	0	0	1,930	0
Canada	0	0	757	695	0	2,212	969	0
Russia	0	0	0	0	252	459	422	0
Philippines	21	20	0	24	0	0	283	0
Others	683	721	4,982	1,255	1,341	1,151	117	575
Total	4,226	11,575	21,143	24,911	9,581	13,687	7,902	574

Table 6: Imports, HTC 2207.10.01 (in thousands of U.S. dollars)

Country	1995	1996	1997	1998	1999	2000	2001	Jan-Mar 2002

United States	10,680	22,200	28,459	10,658	6,588	21,969	30,278	7,897
Brazil	0	0	0	0	1,112	5,849	10,284	4,291
Cuba	0	0	0	0	0	1,071	4,970	615
Italy	2,414	0	1,507	1,264	10,686	9,530	3,984	0
Guatemala	7,630	8,433	8,720	3,950	6,571	4,839	3,059	210
Others	608	7,124	8,917	7,589	475	6,692	8,369	1,737
Total	21,332	37,757	47,603	23,461	25,432	49,950	60,944	14,750

Table 7: Exports, HTC 2207.20.01 (in thousands of U.S. dollars)

Country	1995	1996	1997	1998	1999	2000	2001	Jan-Mar 2002
United States	1,474	3,489	21,393	28,012	6,270	2,774	506	68
Germany	83	300	0	461	0	0	299	0
Russia	0	0	0	0	0	279	46	0
Guatemala	0	6	10	44	0	18	45	24
Philippines	0	0	0	21	47	43	14	14
Others	44	9	16	116	1,131	96	9	19
Total	1,601	3,804	21,419	28,654	7,448	3,210	919	125

Table 8: Imports, HTC 2207.20.01 (in thousands of U.S. dollars)

Country	1995	1996	1997	1998	1999	2000	2001	Jan-Mar 2002
United States	862	389	2,691	4,021	2,059	1,052	749	183
South Korea	0	1	1	0	1	11	20	0
Germany	3	0	1	5	16	0	0	0
Saudi Arabia	7	0	0	0	0	0	0	0
Others	0	0	65	7	1	2	0	0
Total	872	390	2,758	4,033	2,077	1,065	769	183

Source: Ministry of Economy (SE) & Aduana Mexico.

HFCS TRADE

Due to the imposition of the 20-percent duty on HFCS-containing soft drinks and beverages since January 2002, HFCS imports from the U.S. had been down and were not significant until MY 2004/05. Consumption began to increase as some companies began to use court injunctions, or *amparos,* exempting them from the 20-percent tax on HFCS. According to trade data, imports of HFCS have increased for HTS category 1702.60 from 5,190 MT in MY 2003/04 to 116,081 MT in MY 2004/05. About 50 percent of these imports came from Canada at zero duty. Imports under HTS category 1702.40 also increased from 2,209 MT in MY 2003/04 to 34,062 in MY 2004/05. MY 2005/06 HFCS trade situation is different since the U.S. and the Mexican governments agreed to exchange 250,000 MT of Mexican sugar for the same quantity of U.S. fructose. Therefore imports are expected to be near that amount for MY 2005/06. Fructose imported from the U.S. is subject to an import permit requirement

(See report MX 5103). Larger imports are not expected for MY 2005/06 even if Mexico decides to eliminate the HFCS tax as requested by the WTO resolution. The Mexican government has suggested that with the elimination of the tax, they may apply most favored nation (MFN) duties in force since April 2002 to U.S. HFCS (See report MX 2059). The MFN duties are 210 % for HFCS-55, and 156 % for HFCS-42 (See Policy Section). Further, domestic pressure on the GOM to limit HFCS in whatever manner possible will remain strong, especially given the production and stocks of sugar projected for MY 2005/06.

4. SWEETENER PRODUCED FROM CORN

High fructose corn syrup (HFCS) production for CY 2006 is forecast to reach about 300,000 to 350,000 MT dry basis. High fructose corn syrup (HFCS) production for CY 2005 increased to about 300,000 MT dry basis, an increase of about 114% over CY 2004. This increase was stimulated by the provision of *amparos*, which allowed bottling companies to use domestic and imported (U.S and Canadian) HFCS without being subject to a 20 percent tax on HFCS-containing beverages. Industry sources have indicated that given recent increases due to *amparo* usage, domestic production is near capacity and it is unlikely that increased production capacity will be possible in the short term.

The Mexican fructose industry produces fructose with domestic and imported U.S. yellow corn under special duties. The industry representing the fructose producers, IDAQUIM, recently stressed the point that the industry has been using domestic yellow corn and continues to increase usage of domestically produced yellow corn for fructose production. For MY 2005/2006 the industry signed a contract with the National Association of Corn Producers for a million metric tons of yellow corn. This contract supplies the Mexican fructose companies with about 40 to 50 percent of their needs for yellow corn. The industry contracted for 800,000 MT of corn for the previous cycle.

5. BIODIESEL PRODUCED FROM OILSEEDS, VEGETABLE OILS, PALM/COCONUT OIL (AND OTHER OILS OF FRUIT), ANIMAL FATS/OILS

The only information available for biodiesel produced from animal fats or oils is that of the ITESM/Energeticos plant, whose products are still being tested. They report that, although potential output is one million liters per month, they are currently producing between 500,000 and 600,000 liters per month, and all the biodiesel produced is used in a couple of student-transporting buses.

6. BIODIESEL, ETHANOL, OTHER FUELS PRODUCED FROM OTHER BIO-MASS (WHEAT, WINE, WOOD PRODUCTS, OTHER)

According to Emision Foundation, projects to obtain ethanol from castor-oil plant (*Ricinus communis*) have been carried out and there is a large potential for exploiting this vegetal variety. Castor seed contains between 40% and 60% oil that is rich in triglycerides, mainly ricinolein. This is still being analyzed by research centers in order to have projections of potential yields of ethanol from this plant.

7. BIO-FUELS IMPACT ON TRADITIONAL USES SUCH AS FEED, FOOD, TRADE

Because of Mexico's recent incorporation into the bio-fuel "race", it is too early to accurately anticipate the impact that this will have on feed, food, trade and other issues, though it is foreseeable that patterns observed in more experienced countries could repeat themselves in Mexico. However, it is clear that production shifts of white corn to yellow corn (as envisioned

by Emision) will have an impact on the food sector, the main destination of white corn in Mexico. Also, there will certainly be price fluctuations of agricultural inputs and thus creating the GOM's cautionary approach of its official position on the topic. The bio-fuel studies carried out by SENER will present potential scenarios, out of which further and more precise information will eventually become available. Nonetheless, it is clear that, according to information provided by public and private sources, the main objective will be to present agricultural workers with a feasible and remunerative alternative to their current conditions, while also providing a clean, environment-friendly option to the energy sector.

8. POST COMMENT -

Information presented in this report was derived from different credible public and private sources. Ethanol and biodiesel have become topics of increasing interest in the country and news stories abound, on new production plants being built around the country and with projections of millions of gallons of biodiesel to be produced over the next six months. However, according to Post interviews with experts, the reality is that the ethanol industry in Mexico is still in its infancy and has a long way to go. Small, isolated experimental ethanol and bio-diesel projects already exist but due to the lack of a domestic market and national bio-fuel public policy, these early initiatives have yet to develop into an integrated mature industry. Post will continue to monitor this developing story.